

**Charles R. Pierce**  
Regulatory Affairs Director

**Southern Nuclear  
Operating Company, Inc.**  
40 Inverness Center Parkway  
Post Office Box 1295  
Birmingham, Alabama 35201  
  
Tel 205.992.7872  
Fax 205.992.7601

September 13, 2013



Docket Nos.: 50-424  
50-425

NL-13-1937

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555-0001

Vogtle Electric Generating Plant  
Pilot 10 CFR 50.69 License Amendment Request  
Response to Request for Additional Information

Ladies and Gentlemen:

By letter dated August 31, 2012, Southern Nuclear Operating Company (SNC) requested amendments to the Vogtle Electric Generating Plant (VEGP) Units 1 and 2 (TAC NOS ME9472 and ME9473). The proposed amendments would revise the VEGP licensing basis to implement 10 CFR 50.69, risk informed categorization and treatment of structures, systems, and components for nuclear power plants.

By letter dated April 17, 2013, the NRC requested additional information. SNC responded to the request by letter dated May 17, 2013 and noted responses to requests for additional information (RAIs) 19, 25, 26 and 27 would require additional time to develop and would be provided within 120 days from the date of the SNC letter. SNC provided the responses to RAIs 19 and 27 by letter dated July 2, 2013. In the response to RAI 27, SNC identified that a Base-Case Sensitivity (BCS) model would be developed and used for the categorization process and to respond to RAIs that request sensitivity analyses on NRC approved methods including RAIs 25 and 26.

The enclosure to this letter provides a summary of the BCS model results and SNC's response to RAIs 25 and 26.

This letter contains no NRC commitments. If you have any questions, please contact Ken McElroy at (205) 992-7369.

U. S. Nuclear Regulatory Commission  
NL-13-1937  
Page 2

Mr. C. R. Pierce states he is Regulatory Affairs Director of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and, to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

*C. R. Pierce*

C. R. Pierce  
Regulatory Affairs Director



Sworn to and subscribed before me this 13<sup>th</sup> day of September,  
2013.

*Laura Y. Crompton*  
Notary Public

My commission expires: 11-2-2013

Enclosure:

cc: Southern Nuclear Operating Company  
Mr. S. E. Kuczynski, Chairman, President & CEO  
Mr. D. G. Bost, Executive Vice President & Chief Nuclear Officer  
Mr. T. E. Tynan, Vice President – Vogtle  
Mr. B. L. Ivey, Vice President – Regulatory Affairs  
Mr. B. J. Adams, Vice President – Fleet Operations  
RType: CVC7000

U. S. Nuclear Regulatory Commission  
Mr. V. M. McCree, Regional Administrator  
Mr. R. E. Martin, NRR Senior Project Manager - Vogtle  
Mr. L. M. Cain, Senior Resident Inspector – Vogtle

State of Georgia  
Mr. J. H. Turner, Environmental Director Protection Division

**Vogtle Electric Generating Plant  
Request to Revise the Licensing Basis to Implement 10 CFR 50.69  
Response to Request for Additional Information  
Regarding Pilot 10 CFR 50.69 License Amendment Request**

**Enclosure**

**Response to Request for Additional Information  
Regarding Pilot 10 CFR 50.69 License Amendment Request**

**Base Case Sensitivity Model:**

In the response to RAI #27 dated July 2, 2013, SNC identified that a Base-Case Sensitivity (BCS) model would be developed and used for the categorization process and to respond to RAIs that request sensitivity analyses on NRC approved methods (including RAIs 25 and 26). As identified in the RAI #27 response, the BCS model removes the three Unendorsed Analysis Methods (UAMs) used in the Vogtle fire PRA and changes the alignment factor for pump oil fires to the factor endorsed by the NRC.

Background Information:

In the July 2, 2013 response to RAI #27, SNC prepared a list of fire PRA methods that have been in use in the industry and the subject of recent communications relative to Unendorsed Analysis Method (UAM) / NRC endorsement status, and identified their applicability to the Vogtle fire PRA.

As stated in the response to RAI #27, the following methods are used in the Vogtle fire PRA that can be characterized as a UAM:

- Not using 0.001 as the lowest value for failure of manual suppression (using values less than 0.001, even 0);
- Not using lower failure threshold for sensitive electronics;
- Electrical cabinet heat release rate or severity factors and cabinet to cabinet fires (one method rejected, one method commented, others exist)

In addition, SNC also identified in the response to RAI #27 that:

- Although an endorsed method was used for alignment factor for pump oil fires, the alignment factor used by SNC in the Vogtle fire PRA for pump oil fires is slightly different than the factor accepted by the NRC staff in the NRC endorsement letter dated June 21, 2012 (ML12172A06).

In our response to RAI #27, SNC stated that SNC would remove the three unendorsed methods from the Vogtle fire PRA and change the alignment factor for pump oil fires to the factor endorsed by the NRC, and refine the resulting model as necessary using the approved/ endorsed methods. The model so generated would be designated as the Base-Case Sensitivity model (BCS model).

SNC stated it would use the BCS model to respond to other RAIs that request sensitivity analyses on NRC approved methods (e.g., RAIs # 25 and # 26). Each sensitivity study would be performed individually.

Enclosure to NL-13-1937  
Response to Request for Additional Information  
Regarding Pilot 10 CFR 50.69 License Amendment Request

Results:

SNC has removed these three UAMs from the Vogtle fire PRA and changed the alignment factor for pump oil fires to the factor endorsed by the NRC. In addition, further refinement was performed to remove conservatisms that were revealed following removal of the UAMs. After completion of these model adjustments:

- The Unit 1 CDF and LERF for the BCS model are 5.30E-05 and 1.76E-06 per year, respectively.
- The Unit 2 CDF and LERF for the BCS model are 6.0E-05 and 1.99E-06 per year, respectively.

These sensitivity estimates are approximately 8% higher for CDF and approximately 16% lower for LERF.

**NRC RAI # 25**

UNC-A2-01 noted that ignition frequencies from Section 10 of NUREG/CR-6850 were used. Supplement 1 states that a sensitivity analysis should be performed when using the fire ignition frequencies in the Supplement instead of the fire ignition frequencies provided in Table 6-1 of NUREG/CR-6850. Provide the sensitivity analysis of the impact on using the Supplement 1 frequencies instead of the Table 6-1 frequencies on the importance measures and therefore the safety significance of SSCs for all of those bins that are characterized by an alpha that is less than or equal to one.

**SNC Response**

Using the Base-Case Sensitivity (BCS) model, a sensitivity analysis was performed using fire ignition frequencies provided in Table 6-1 of NUREG/CR-6850. The CDF and LERF for the BCS model and for this sensitivity run are summarized in the following table for comparison.

CDF and LERF comparison for a sensitivity run using fire ignition frequencies provided in Table 6-1 of NUREG/CR-6850						
CDF				LERF		
Unit	Base Case Sensitivity (BCS) Model	w/ Fire Ignition Frequencies from Table 6-1 of NUREG/CR-6850	% Change	Base Case Sensitivity (BCS) Model	w/ Fire Ignition Frequencies from Table 6-1 of NUREG/CR-6850	% Change
<b>Unit 1</b>	5.30E-05	6.71E-05	27%	1.76E-06	2.75E-06	56%
<b>Unit 2</b>	6.00E-05	7.46E-05	24%	1.99E-06	3.01E-06	51%

Enclosure to NL-13-1937  
Response to Request for Additional Information  
Regarding Pilot 10 CFR 50.69 License Amendment Request

In order to evaluate the impact on the 10 CFR 50.69 categorization process importance measures, the metrics of interest and associated thresholds are summarized below. These thresholds are in accordance with the NEI 00-04 methodology. If a component exceeds one of these thresholds, it is categorized as High Safety Significant (HSS):

Fussell-Vesely (F-V) > 5.0E-03  
Risk Achievement Worth (RAW) > 2.0 for single event  
Risk Achievement Worth (RAW) > 20.0 for common cause event

The following information summarizes the impact on the 10 CFR 50.69 categorization process importance measures for Unit 1.

- The Unit 1 CDF sensitivity run using fire ignition frequencies provided in Table 6-1 of NUREG/CR-6850 did not identify additional components meeting the above HSS criteria compared to Unit 1 BCS run for CDF.
- The Unit 1 LERF sensitivity run using fire ignition frequencies provided in Table 6-1 of NUREG/CR-6850 did not identify additional components meeting the above HSS criteria compared to Unit 1 BCS run for LERF.

In conclusion, when CDF and LERF results are combined, the Unit 1 sensitivity run using fire ignition frequencies provided in Table 6-1 of NUREG/CR-6850 did not identify additional components meeting the NEI-00-04 HSS criteria compared to the Unit 1 BCS run.

The following information summarizes the impact on the 10 CFR 50.69 categorization process importance measures for Unit 2.

- The Unit 2 CDF sensitivity run using fire ignition frequencies provided in Table 6-1 of NUREG/CR-6850 identified only one additional component (11204U6083) as meeting the NEI-00-04 criteria for HSS compared to the Unit 2 BCS run for CDF. This component was identified as high through the associated common cause basic event. The same common cause basic event was not high in the Unit 2 BCS run; however, 3 out of 4 of the components (11204U6083, 11204U6084, 11204U6085, and 11204U6086) that make up this common cause event were HSS in the Unit 2 BCS run. Therefore, the expectation is that during the categorization review of this system by the Integrated Decision-making Panel (IDP), the prudent IDP decision would be to categorize 11204U6083 as HSS along with the other 3 components in this group. Considering this expectation, the NUREG/CR-6850 sensitivity run would not have identified new additional HSS components.
- The Unit 2 LERF sensitivity run using fire ignition frequencies provided in Table 6-1 of NUREG/CR-6850 identified one components meeting the NEI-00-04 HSS criteria compared to the Unit 2 BCS run for LERF. However, this component is HSS for Unit 2 CDF sensitivity run using fire ignition frequencies provided in Table 6-1 of NUREG/CR-6850 and the

Enclosure to NL-13-1937  
Response to Request for Additional Information  
Regarding Pilot 10 CFR 50.69 License Amendment Request

Unit 2 BCS run for CDF. Therefore, it is not counted as a net increase for the purpose of reporting net results for this sensitivity study.

In conclusion, when CDF and LERF results are combined, the Unit 2 sensitivity run using fire ignition frequencies provided in Table 6-1 of NUREG/CR-6850 identified only one (1) additional component meeting the NEI-00-04 HSS criteria compared to the Unit 2 BCS run. As mentioned earlier, when allowing for the IDP process to apply the expected prudence, this sensitivity would not have identified new additional HSS components.

Based on the results presented above for Units 1 and 2, it is judged that the impact of using the NUREG/CR-6850 Supplement 1 fire ignition frequencies instead of the Table 6-1 frequencies on the importance measures has minimal effect and therefore the safety significance of SSCs is minimal.

**NRC RAI # 26**

It was recently stated at the industry fire forum that the Phenomena Identification and Ranking Table Panel being conducted for the circuit failure tests from the DESIREEFIRE and CAROL-FIRE tests may be eliminating the credit for Control Power Transformers (CPTs) (about a factor 2 reduction) currently allowed by Tables 10-1 and 10-3 of NUREG/CR-6850, Vol. 2, as being invalid when estimating circuit failure probabilities. Please perform a sensitivity study to quantify the impact of CPT credit on SSC categorization.

**SNC Response**

Using the Base-Case Sensitivity (BCS) model, a sensitivity analysis was performed by reducing Control Power Transformers (CPTs) credit by a factor of 2. The CDF and LERF for the BCS model and for this sensitivity run are summarized in the following table for comparison.

CDF and LERF summary for a sensitivity run associated with reducing Control Power Transformers (CPTs) credit by a factor of 2						
CDF				LERF		
Unit	Base Case Sensitivity (BCS)	Control Power Transformers (CPTs) Sensitivity	% Change	Base Case Sensitivity (BCS)	Control Power Transformers (CPTs) Sensitivity	% Change
<b>Unit 1</b>	5.30E-05	6.19E-05	17%	1.76E-06	1.99E-06	13%
<b>Unit 2</b>	6.00E-05	6.84E-05	14%	1.99E-06	2.29E-06	15%

In order to evaluate the impact on the 10 CFR 50.69 categorization process importance measures, the metrics of interest and associated thresholds are summarized below. These thresholds are in accordance with the NEI 00-04 methodology. If a component exceeds one of these thresholds, it is categorized as high Safety Significant (HSS).

- Fussell-Vesely (F-V) > 5.0E-03
- Risk Achievement Worth (RAW) > 2.0 for single event
- Risk Achievement Worth (RAW) > 20.0 for common cause event

Enclosure to NL-13-1937  
Response to Request for Additional Information  
Regarding Pilot 10 CFR 50.69 License Amendment Request

The following information summarizes impact on the 10 CFR 50.69 categorization process importance measures for Unit 1.

- The Unit 1 CPT sensitivity run for CDF identified 15 additional High Safety Significant (HSS) components compared to the Unit 1 BCS run for CDF.
- The Unit 1 CPT sensitivity run for LERF did not identify additional HSS components compared to the Unit 1 BCS run for LERF.

In conclusion, when CDF and LERF results are combined, the Unit 1 CPT Sensitivity run identified 15 additional components as HSS compared to the Unit 1 BCS run.

The following information summarizes impact on the 10 CFR 50.69 categorization process importance measures for Unit 2.

- The Unit 2 CPT sensitivity run for CDF identified nine (9) additional components meeting the HSS criteria compared to the Unit 2 BCS run for CDF.
- The Unit 2 CPT sensitivity run for LERF did not identify additional components meeting the HSS criteria compared to the Unit 2 BCS run for LERF.

In conclusion, when CDF and LERF results are combined, the Unit 2 CPT Sensitivity run identified nine (9) additional components as HSS compared to the Unit 2 BCS run.

When comparing the Unit 1 results with the Unit 2 results for CPT sensitivity run, it was noted that four (4) HSS components were unit equivalent, i.e., the corresponding component in Unit 1 and in Unit 2 met the HSS criteria. For the purpose of reporting net results for this sensitivity study, if a component meets the HSS criteria in one unit and the corresponding component in the opposite unit also meets the HSS criteria, it is counted only once rather than one per unit. Thus, the incremental count is reduced by four (4). Therefore, the CPT sensitivity run adds a total of 20 (= 15 in Unit 1 + 9 in Unit 2 – 4 unit equivalent) HSS components compared to the BCS run.

Based on insights obtained from Units 1 and 2 results, it is anticipated that eliminating the CPT credit would identify approximately 20 more components as HSS.